

Comet Nuclear Magnitudes and a New Size Distribution Using Archived NEAT Data.

Raymond Bamberg, Michael D. Hicks, Steven Pravdo, Eleanor Helin, and Ken Lawrence
(JPL/CalTech)

A reliable estimate of the size distribution of cometary nuclei provides important constraints on the formation and dynamical/physical evolution of these bodies as well as their relative proportions in the near-Earth population. The basic data of nuclear sizes has been difficult to obtain, due to the shroud of dust that envelops the nucleus across a wide range of heliocentric distances. Only two comets, P/Halley and P/Borrelly, have had direct imaging of their nuclei from spacecraft encounters, though high spatial-resolution imaging by the Hubble Space Telescope has also yielded very reliable diameters [1]. Other observers have recently used ground-based photometry to obtain cumulative size-frequency distributions which are not in agreement [2,3]. One possible source of error is the need to include data from a wide range of telescopes and reduction techniques. We shall obtain a new estimate of the size-frequency distribution using a self-consistent dataset.

The Near-Earth Asteroid Tracking (NEAT) Program at the Jet Propulsion Laboratory remotely operates two 1.2-meter telescopes at widely geographically separated locations on a near-nightly basis. Though optimized to discover near-Earth asteroids, we have obtained over 300 CCD images of approximately 40 short and long-period comets over the last 15 months. Though we model coma contamination for all images, we shall concentrate on the fraction of comets at heliocentric distances greater than 3 AU. Our data is used to derive an independent comet size-frequency distribution.

[1] Lamy, P. et al. (2002) *Icarus*. 156, 442.

[2] Fernandez, J.A., et al. (1999) *Astronomy & Astrophysics*. 352, 327.

[3] Weissman, P.R. and S.C. Lowry (2001) *DPS* #33, 31.04.